

**Docket No. SACHPO142US
(FORMERLY SOU747/4-3 US)**

Serial No. 09/990,651

REMARKS

Upon entry of the present paper, claims 1-18, 21-27, 29-35, 37-43 and 45-54 are pending in the application. Claims 19, 20, 28, 36, 44 and 49 were subjected to the restriction requirement and are now canceled, without prejudice to Applicants' right to re-file these claims in a divisional application. New claims 50-54 are added herein. Support for the new claims may be found, for example, in the claims and in the specification as originally filed. Claims 1, 6, 21, 29, 37 and 45 are amended herein. Support for the amendment of claims 1, 21, 29, 37 and 45 may be found, for example, at [0034], 4th and 5th sentences. Claim 6 is amended to correct an obvious misspelling.

Applicants note with appreciation the indication that claim 11 is allowable. Accordingly, Applicants have amended claim 11 into independent format.

Applicants respectfully request reconsideration of the application and claims based on the foregoing amendments and the following remarks.

Rejection of Claims Over Moulton in view of Jeapes et al.

In the Office action, claims 1-10, 12-28, 21-27, 29-35, 37-43 and 45-48 stand rejected as obvious over Moulton, U.S. Patent No. 5,951,845 in view of Jeapes et al., WO 01/15175. Applicants respectfully traverse this rejection. Applicants submit that the invention would not have been obvious over the contended combination of references because these references, even if combined, fail to disclose all the features of the presently claimed invention. Furthermore, Applicants respectfully submit there would be no motivation to combine these references, given the distinct differences between them.

Applicants have amended the claims to make more clear that it is the desired ionic liquid that is recovered from the solution in the electrolysis cell. Applicants respectfully submit that this makes clear the distinction of the claimed invention over the contended combination of prior art references.

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Specifically, the contended combination of references fails to disclose that the ionic liquid is recovered from the solution in the electrochemical or electrodialysis cell as defined in the present application and claims.

More specifically, Jeapes et al. teaches that the ionic liquid is subjected to conditions under which it is decomposed into "component compounds". Jeapes et al. recovers not the ionic liquid, but decomposition products thereof referred to as "component compounds", which can then be used to reconstitute or regenerate the ionic liquid, if desired. Jeapes et al. teaches that the ionic liquid is thermochemically broken down into component compounds of the ionic liquid, the component compounds are separated from contaminants by distillation at high temperature, and then the separated component compounds may be reacted with appropriate reactant(s) to regenerate the ionic liquid. This is not what is claimed by the present inventors in the present application. In the present application, the ionic liquid is directly recovered from the solution in the cell in intact form. The ionic liquid is not decomposed by the recovery step. The material in the solution is further processed to remove solvent, but in doing so it is not decomposed as taught by Jeapes et al. Jeapes et al. is an entirely different process. The only aspect of Jeapes et al. in common with the present invention is the use of an ionic liquid.

There is no obvious way to combine the teachings of Jeapes et al. and Moulton, even if a person of ordinary skill in the art thought to do so. And, even if the person attempted such a combination, it would not lead to and would not be described by the presently claimed invention.

For this reason, the presently claimed invention would not have been obvious to a person of ordinary skill in the art at the time the invention was made. Applicants therefore request the Examiner to withdraw the rejection of Applicants' claims over the contended combination of Moulton with Jeapes et al.

Moulton discloses a process for recovering an organic hydroxide from waste solutions containing the organic hydroxide and impurities including steps of (1)

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contacting the waste solution with a metal ion scavenger to remove metal ion impurities; (2) charging the waste solution to an electrochemical cell containing at least two compartments, a cathode, an anode and a divider and passing a current through the cell whereby the organic hydroxide is regenerated; and (3) recovering the organic hydroxide from the cell. Thus, Moulton charges an impure material to an electrochemical cell and recovers a purified material from the cell, but does not in any way decompose the organic hydroxide in doing so. Furthermore, because Moulton charges an impure organic hydroxide to the cell, Moulton does not carry out step (1) of the claimed process, i.e., "charging the cell with a first solution comprising the desired cation for the ionic liquid to be produced and a second solution comprising the desired anion for the ionic liquid to be produced".

Jeapes et al. is concerned with removing fission products, including radioactive materials, from a solution also including an ionic liquid. Thus, Jeapes et al. teaches that the ionic liquid is not the actual target, but for environmental and economic reasons, it is beneficial to try to recycle and not lose the components of the ionic liquid while removing the fission products. See, e.g., Jeapes et al. from p. 1, line 26 to page 2, line 21.

Jeapes et al. teaches the "thermolysis", i.e., thermal decomposition, of the ionic liquid into component compounds. Jeapes et al. teaches that the ionic liquid is subjected to temperatures ranging from 200°C to 300°C for periods of 2-3 hours at pressures below 2 mm Hg. This treatment causes the ionic liquid to decompose and the resulting components to distill off. At page 3, lines 27-29, Jeapes et al. teaches:

These conditions allow for only partial decomposition of the ionic liquid and therefore the recovery of as many useful component compounds of the ionic liquid as possible."

At p. 4, lines 2-5, Jeapes et al. teaches:

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Thermolysis of the ionic liquid results in the evolution of volatile thermolysis products. In the case of 1-methyl-3-ethylimidazolium chloride these are 1-methylimidazole, 1-ethylimidazole, chloromethane and chloroethane. Chloroethane then decomposes to hydrogen chloride and ethene.

Thus, as explicitly stated by Jeapes et al., the ionic liquid is chemically decomposed into component compounds that are not ionic liquids but which are volatile compounds that may be recovered by utilizing that volatility, i.e., by distilling them off. This would not be understood in the art and can not be reasonably contended to constitute "recovery" of the desired ionic liquid and recovery of the decomposed components. This is decomposition of the ionic liquid, as explicitly stated by Jeapes et al.

Jeapes et al. continues, at p. 4, lines 11-12:

1-methylimidazole and 1-ethylimidazole can be separated by distillation to allow for *regeneration* of the specific ionic liquid 1-methyl-3-ethyl-imidazolium chloride. (Emphasis added.)

As will be understood, 1-methylimidazole and 1-ethylimidazole are component compounds of the ionic liquid, formed by decomposition of the ionic liquid. Thus, as explicitly stated by Jeapes et al. the ionic liquid must be *regenerated* from the component compounds 1-methylimidazole and 1-ethylimidazole which are obtained from the thermal decomposition of the ionic liquid. Regeneration is not recovery as defined in the present application.

Jeapes et al. extols the benefits of being able to regenerate some useable materials from the fission material-contaminated mixtures, rather than having to calcine the entire mixture in order to obtain the fission product residue in a form that can be disposed. See, e.g., Jeapes et al. at p. 3, lines 4-7.

Lest the Examiner contend that Applicants are "attacking the references individually", the foregoing discussion of Jeapes et al. is provided to demonstrate the distinct differences between Jeapes et al. and both Moulton and the present invention. Due to these differences, Applicants respectfully submit that Jeapes et al. simply

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cannot be combined with Moulton in any way that would lead a person of ordinary skill in the art to Applicants' claimed invention.

Jeapes et al. in combination with Moulton simply fails to disclose or suggest recovering the ionic liquid as in the present invention. Jeapes et al. does nothing more than recover thermochemically decomposed materials resulting from the thermolysis of the ionic liquid, and teaches that some of these decomposed materials can be chemically (not electrolytically) treated to regenerate the ionic liquid. There is no obvious way to combine the teachings of Jeapes et al. with Moulton. Any such combination would be completely different from anything disclosed or claimed by Applicants' presently claimed invention.

Thus, Applicants respectfully submit that the process of Jeapes et al. cannot be combined with the disclosure of Moulton as contended by the Examiner.

There is no motivation to make such a combination, which literally requires the destruction of the ionic liquid. One would not go through a process of destroying the ionic liquid, then chemically reconstituting it, and then subjecting it to a process such as that of Moulton. There is simply no reason to carry out all the extra steps.

All of the claimed elements are not disclosed in the contended combination of references, because Jeapes et al. does not "show the conventional technique used in the art to purify and/or concentrate the ionic liquid" as contended by the Examiner. Jeapes et al. discloses a process for removing the ionic liquid from the targeted fission materials, the removing including decomposing the ionic liquid into volatile components that are themselves distilled off.

The recovery techniques of the present invention, specifically mentioned in [0029], are not used to distill, evaporate or otherwise remove the ionic liquid from some solution; rather these techniques are used to remove solvent, usually including water, from a solution in which the ionic liquid is dissolved in the solvent. See, e.g., [0034], in which a 1.2 M solution of the ionic liquid is neutralized and then concentrated under rotary vacuum. See also, [0035], in which the 1-butyl-3-methylimidazolium acetate produce is isolated "by removing the water by rotary evaporation". These processes do

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not decompose the ionic liquid; they simply remove the solvent from the otherwise purified ionic liquid. See. e.g., [0031] in this regard.

Accordingly, Applicants respectfully submit that the contended combination of Jeapes et al. and Moulton would not have rendered obvious Applicants' claimed invention at the time it was made. Withdrawal of the rejection is respectfully requested.

CONCLUSION

For all these reasons, Applicants respectfully request the Examiner to reconsider and withdraw the rejection of Applicants' claimed invention set forth in the Office action mailed 05 July 2005.

Should the Examiner consider that a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

The Commissioner is hereby authorized to charge the fee for one additional independent claim (\$100.00) to our Deposit Account No. 18-0988, Docket No. SACHPO142US. No additional claim fees are believed to be due, since the number of claims canceled herein exceeds the number of new claims added.

In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 18-0988, docket No. SACHPO142US.

Respectfully submitted,
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